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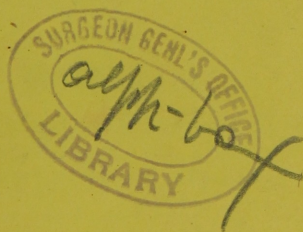
QUININE;

ITS USES IN

PREVENTING AND CURING Miasmatic Infection

AND

DISEASE.



1700 (2.)

QUININE

AS A

PROPHYLACTIC OR PROTECTIVE

FROM

MIASMATIC POISONING,

A

PREVENTIVE OF PAROXYSMS OF MIASMATIC DISEASES,

TOGETHER WITH SOME REMARKS UPON ITS USE IN THE TREATMENT
OF DEVELOPED MIASMATIC DISEASES,

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1862.

QUININE AS A PROPHYLACTIC OR PREVENTIVE FROM Miasmatic Poisoning.

For more than two hundred years, something of the medicinal properties of the Peruvian bark has been known to the profession, though the Jesuits, its probable discoverers, controlled its employment for some period of time.

Its value from its early medical history, down to our own day, has been very universally acknowledged by the civilized world, and has doubtless been incalculable.

But along with lime juice, chloroform, and ether, and like steam in philosophy, and the galvanic fluid in chemistry, it has been reserved to our own century, to our wonderfully advanced scientific and clinical investigations, to develop the native resources, and to disclose the hidden qualities of the "Jesuit's bark," and to appropriate them in the most advantageous and skillful manner, to the prevention, and alleviation of the sufferings, as well as to the cure of the diseases of humanity.

Often during my residence in that country, over which Pizarro, with his thousands of followers, traveled to their "El Dorado," and to the home of the Incas, have I congratulated myself upon having come into the world after the discoveries made by those adventurous spirits, had grown into certain and practical utility to mankind.

The terrors of pestilence, and death, suffered by the early Spanish explorers, and gold hunters, in the tropical and miasmatic regions of their new world, were most shocking, and to us almost incredible. Expeditions sent into those countries in our own day, with all the aids of advanced science and medical discoveries, suffer severely enough, as is well known.

Though cinchona has been one of the most universally employed articles of the *Materia Medica*, for so many years, we have no record of its having been employed, other than as a *curative* agent, till within a very few years.

The Jesuits had an idea, that a fever cured by it, as they employed it, which was in the form of infusion of the fresh bark, would not recur, that the individual was permanently protected by it. I need not say, how completely time has dispelled that delusion.

But that it possessed the power to *prevent* miasmatic infection, was not, so far as I have been able to ascertain, suspected by them. This idea is, in all probability, a modern one, dating, there is reason to believe, only a very few years back. The labors of the chemist, in producing the concentrated form of the active principles, thus rendering it vastly more generally available, was one of the triumphs of science, in the development of this mighty agent; but the supposed discovery, that this product could be depended upon, in all its now extensive, even universal applicability, as a *preventive* of the *infection* which produces the disease, exalted it to the very highest rank among medicinal agents, and placed cinchona, with its principles, in the proud position of an especial gift from Divinity.

If it have this power, he who first made the discovery, deserves a monument to commemorate his act, as truly as does the immortal Jenner.

I have not been able to get a reliable history of this might be, fortunate individual, but the evidence is strong, that whoever he be, his experiments were made with the bark, and not with the quinine.

About the year 1850, earlier or later, the first records of the employment of quinine for the purpose of *preventing* infection were made.

But there is much doubt in my mind, if any of these authors, who have recorded their experience in this matter, really mean to express a belief, that quinine, taken to the extent of influencing the nervous system to a sensible degree, will, during such influence, prevent infection from miasm, whatever the character of the exposure. Indeed, one of the earliest advocates of the prophylactic use of quinine, as he terms it, quoted in a recent paper, by the sanitary commission, recommends "that its use be continued, not only while the men were exposed in unhealthy localities, but for at least fourteen days after they had returned on board, in order that the antagonistic influence of the medicine might be kept up until the incubative period of the disease had passed."

Had he believed in the power of quinine to prevent infection

he certainly could not have found necessity for continuing the administration after the person had been removed from the poison. Even Professor George B. Wood's evidence in this matter, quoted by the same commission, I have my doubts about the intended meaning of. He says, "there is no prophylactic measure against the miasmatic fever, at all comparable in efficiency to the use of this medicine. It seems reasonable to suppose, that the same impression on the system, which prevents the return of the paroxysm will prevent the occurrence of the first."

When we hereafter see that for a period of four years I was constantly inhaling the noxious atmosphere of the miasmatic localities of the isthmus of Panama and did not suffer a single attack, though I was frequently obliged to resort to quinine to prevent it, and of course must have been infected deeply, my doubts as to what Dr. Wood's real sentiments are in this matter, may be comprehended.

For four years I prevented the first paroxysm, which he thinks is to be reasonably expected, but I did not prevent infection.

Hence I see no reason to believe that he intends to state as his belief, that this article will prevent infection.

Nor is this use of quinine one into which a person would be led by force of reasoning, as this most respectable author would seem to imply from his language, when he says, "upon the same principles as those on which periodical disease may be cured, they may also be prevented by the sulphate of quinine."

For example, almost every one has seen an approaching paroxysm of intermmitent broken completely up, and the patient cured of the attack, by an intoxicating dose of brandy or other alcoholic drink; and yet who would think of keeping a man constantly under the influence of this class of stimulants to protect him from miasmatic poison.

Emetics are well known to frequently arrest the development of a paroxysm, and to break up the order of an attack, and even cure the disease; still no one in his senses could, from that fact, arrive at the conclusion that to protect an individual from infection it were only necessary to keep him continually nauseated.

So that if quinine produces a curative impression upon the same principle that it produces a protective one, it must have properties peculiar to itself which must be discovered by experience, and not arrived at by reasoning.

But if the professor means to say that the same principles are

applicable to the symptoms of *poisoning* and to *probable* disease, as to the treatment of *developed* fever, no doubt can be entertained of the truthfulness of his position as we shall see.

We could go on almost indefinitely bringing quotations from authors who have written more or less upon the subject, but at the end we should remain in the same state of doubt as to their *precise* opinions that the extracts above quoted have left us in.

It is singular, but nevertheless true, that all of this ambiguity arises from the employment by all of these authors, of a single word whose signification is by no means well defined. I allude to the word *prophylactic*. On this account we will cease to employ it, and adopt in its place the word *protective*, whose signification is too obvious to admit the possibility of a doubt.

I make this explanation by way of apology, for what might appear to be an unceremonious discharge of a term which has been so long and so illustriously patronized. Our remarks then will be made in the following order, viz., first, the *protective* uses of quinine; second, its *preventive* uses; and third, its *curative* uses.

Among the first, if not *the* first dangers the emigrant is exposed to after his arrival in a miasmatic locality, whether in the tropical regions of the world, or in our own country during the hot seasons of the year, are those attending the fever known by the various names, *Remittent*, *Bilious Remittent*, *Climatorial*, *Acclimating*, *Climate Fever*, and as I have (for the greater simplicity in my Lectures on Diseases of Tropical America, of which this paper is an extract), called it the "*First Miasmatic Fever*."

Consequently, the first, the invariable, and the inevitable enquiry is, what can be done to avoid them?

Such in truth should be the enquiries; for with comparatively rare exceptions, these first paroxysms of miasmatic fever are by far the most severe and immediately dangerous, of any the individual will ever suffer, however long he may remain in the unhealthy region.

This is *the* fever, which both in the West and in the East Indies, in Africa and in tropical America, has given the forbidding and terrible character to tropical fevers, which is pretty universally entertained. It is of paramount importance then, for the recently arrived resident to adopt all possible means to escape this particularly dangerous attack.

But the query arises, as he is to become a permanent resident,

will he not sooner or later certainly suffer his first, and this severe type of fever?

This is so rational an enquiry, that it deserves a careful attention, particularly as it has an important and intimate connection with the subject of this division of our paper.

The law relating to this fever is similar to, or identical with that observed by yellow fever, in localities where it is an annual endemic, viz: the longer one resides under any circumstances, in the locality where it is suffered, the less liable he becomes to its attacks.

A species of toleration of the surrounding influences is acquired, lessening the impression of the poison upon the sensorium; so that after more or less time, aided perhaps by a depression of the powers of life and consequent want of vital force to sustain a violent contest, the intense and destructive character of the fever ceases to occur, except in the rare cases just alluded to.

This fact was stated by Dr. James Johnson, to be also true, to more or less extent, of a continuous high temperature; and he attempted to employ it in explanation of the fact, that Europeans did not suffer yellow fever in East India, becoming "seasoned," as he termed it, by the long sea voyage through the tropics, and a long time in them.

But this distinguished man's theory in this matter, was like many others he entertained, destined to meet opposition, and to be finally overthrown.

I know positively, that persons who have sailed twice through the tropics, and have besides cruised for months in the tropical zone, have taken yellow fever when exposed to it on the Pacific coast of this continent.

Time then, as well as locality, is requisite for this acclimating process.

How is it to be secured in necessary amount, with any degree of certainty?

I do not hesitate in replying, that it can be done by the proper employment of quinine. But this toleration and acclimation not infrequently occur in miasmatic localities, with no aid from the medical art.

Some favoring circumstances, such as removal from the poison during hours of sleep, or the exposure occurring only for a short time, at long intervals, or some peculiar resisting force of constitution. Quinine, by interfering during a part of the time,

with the poisonous impression, I have no doubt has often protracted the period before the first fever so much, that the degree of constitution change required for the modification of the febrile symptoms takes place. A very common error upon this point is entertained and promulgated by high authority.

Even our sanitary commission have published extracts, and have adopted the doctrine, that the quinine, if it have not the effect of arresting the paroxysms, "will always render the disease milder."

We have just seen how it may do so, that it does so in an indirect way, by giving time for acclimation.

The simple introduction of quinine into the system daily for an indefinite time, I have never seen any reason to believe, has anything to do necessarily, with such modification.

I would not like to make such a statement as this commission have, without first taking a certain number of persons about to be exposed to active miasm, and keep one-half on quinine, for some days previous to exposure, and when they were thrown into the miasm, treat them all alike.

If the result showed that those who took quinine beforehand, suffered less than those who did not, then it would be legitimate to attribute the advantage to the quinine.

My experience in this matter has thoroughly convinced me, that the real facts in the case are, that the longer the quinine taken, enables the individual to escape the first miasmatic fever, the more it will be modified, and the milder it will be; but no matter what the quantity taken may have been, if the fever notwithstanding comes on early, no such amelioration in its phenomena will be experienced; it will be in every respect like an undisturbed acclimating fever.

And on the other hand, I have no recollection of ever having seen a case, which by reason of the accidental favorable circumstances we have just enumerated, passed any considerable period of time, as for example a month or two, in miasmatic exposure, without suffering the disease, but had it in a more or less modified form.

From my experience in this particular, I came to congratulating myself and the individual, whenever I saw him passing thirty to forty days of exposure, without symptoms of fever; for I then felt an almost certainty, that when it did appear, it would be in a mild form. But I do not entertain the slightest doubt, that

quinine possesses the power of preventing for an indefinite period, the paroxysms of miasmatic disease.

Nor have I any more doubt, of its power to *protect* even from the *impression* of the poison, which eventually results in the appearance of the phenomena, called symptoms of miasmatic fever.

This is the *protective* action of the medicine, and is the subject of this division of our labor.

My most extended experiments upon this point, were during a period of about one year, and were made upon sailors coming to the port of Aspinwall; of whom I received an unquestionably correct account during their absence from me; though besides, solitary cases, occasionally occurred, during the last three or four years of my residence in the tropics.

Where I first obtained the idea that this poisonous impression or infection could be prevented by the use of the medicine, I have no recollection; probably from some of the medical journals of the time.

At all events, I claim no originality in reference to it. But I have a distinct recollection never to have heard, nor to have read, from any person or anywhere, a suggestion as to the manner of administering, or the quantity administered, so as to produce the desired result with any degree of certainty.

In this respect therefore, I do claim originality, though it is a matter little flattering to one's vanity, from the fact of almost being forced into it, by the experience with the quinine in preventing paroxysms. By this I was taught, that doses too small to produce a sensible and decided impression upon the nervous system, were not to be depended upon.

Why I asked should they be reliable in preventing infection?

This enquiry then, clearly implied the chief principles, to govern the management of an individual during exposure.—Accordingly four grains of the sulphate of quinine were ordered, and instructions given to repeat it, as the *evident* impression it produces upon the brain and nervous system should begin to subside. Any case which did not experience impression from this quantity, was ordered larger doses, till he did feel that some unusual action was going on within him. Some cases did not require more than three grains, but the rule was, to obtain an influence upon the system, appreciable in some manner, and neither stop short of that, nor exceed it, if possible to avoid it.

I soon found that once in twelve hours was sufficiently frequent

for most persons, few constitutions eliminating the absorbed drug sooner.

I have seen cases wherein no influence was evident after eight hours. Such ones require three doses in the twenty-four hours according to the theory, instead of two.

The remaining point in the principles of this management was also suggested by my experience in the treatment for *preventing* the paroxysms of fever, and was strongly supported by the theory of the protective action of the medicine. As in preventing the paroxysms, I had been led to suspend medication the moment the premonitions disappeared; so in preventing *infection*, there appeared especial propriety in suspending the medicine as soon as exposure ceased. Hence the hour for sailing was the hour for laying away the powders or bottle also, and it was not again touched till the return to port.

The result was, that not a single person unineffected before, suffered any febrile attack, so far as I was ever able to learn.

These same experiments, and the continuation more or less constantly since that time of the same management, with such modification as commencing before arriving and continuing for a time after leaving the port, and the results are described in a letter from the president of the Panama railroad company, to Dr. Wm. H. Van Buren, of the sanitary commission, as well as one would expect a layman to do it. The letter is published in the commissioner's document, on the prophylactic use of quinine.

The excellent author of this letter, I am surprised to see, has also availed himself of it, and of the partisan's license, to extol the salubrity of the city of Aspinwall. But these experiments would have been less conclusive and interesting but for the occasional occurrence of meeting an obstinate and self-willed sailor or officer who would not take medicine so long as he was well.

One of these occasions was with a vessel which came to port with almost every one on board fresh hands, that being their first voyage. Among them were three persons who refused to take medicine, as that was not in their contract. After remaining at the wharf about three weeks she sailed. These three persons were taken with fever on their way home, and went to the hospital on their arrival in New York. All the rest had uninterrupted health. So many similar cases occurred during those observations and during my residence in the country, I was compelled to accept them as cause and effect, and not mere coinci-

dence. In fact, I was forced to believe in the "protective" power of quinine, but I did not yield without first carefully canvassing all of the many facts which had come to my knowledge relating to the behavior of miasmatic poison upon a promiscuous population. For example, I had frequently seen persons come into the country and expose themselves for many days in succession to the sources of miasm, and go away perfectly well, never hearing or feeling any the worse for it, and without taking a grain of quinine or other medicine. Again I had seen other cases seriously infected by only a few hours' exposure; yet, after all, the results of my experiments were so uniform I could not possibly attribute them to anything else than the quinine. I have never had a doubt that many of the persons to whom I gave quinine, would have escaped the infection had they not taken it, for it is no unusual thing to meet persons who do escape it for days and weeks together with no medical aid. Neither have I any more doubt that all of those who did get fever, would have escaped it had they taken the quinine as they were desired to do.

This fact of the great difference in susceptibility to miasmatic poison seen so frequently, is not sufficiently considered in making up the conclusions to which most of the writers on this subject of the preventive use of quinine have arrived.

The sanitary commission have published some remarkably illustrative reports of this fact. For example, a surgeon states that seventy-seven men went up an African river; (how long they were gone we are not told, but from the context it would appear, only about one day and night) they all took a dose of quinine when they started, and carried along another dose to take at night, except one man or officer. This one was the only one of the whole seventy and seven men, who suffered fever, supposed to have been contracted on that occasion.

Now, I do not propose to deny, that this person became infected during the exposure stated, but I do believe, that for one, who would have contracted fever upon so slight an exposure, a score or more, would have escaped entirely, with no medication whatever. Hence the inference, that the seventy-six men were protected by quinine, is by no means well drawn. The same document publishes another report, as one favorable to the use of quinine, which is richly worth a notice, as a sample of the extraordinary delusions, even physicians, will be occasionally led into.

Thirty-two officers and men went up the Rio Ponga, and remained in the river two days and two nights. They took four grains of quinine daily. Four cases of fever occurred. On another occasion, thirty-four men were sent into similar exposure, for seven or eight days, and took a dose of quinine *every other day*.

Of these, seventeen had severe *remittent fever*. We see that in the first case, twelve and a half per cent of the whole number, took fever after two days exposure, notwithstanding the daily dose of quinine. And in the second case, fifty per cent fell sick, after seven or eight days of exposure; and with the dose of quinine on alternate days. These results compare very badly with those from similar exposure of thousands of our countrymen, whom I saw in former years crossing the Isthmus of Panama, by the way of the Chagres river and the mule route. This transit rarely occupied less than forty-eight hours, often from three to six days, yet the per centage of fever cases contracted during it, never amounted to anything like twelve and a half per cent, though not a grain of medicine was taken.

Results like that of the second case, would have driven the Californians all by the overland route.

My mind can not resist the evidence afforded by this comparison, that every grain of quinine given in these cases was completely thrown away. And yet, the author of this report comes to a conclusion, which is the most unaccountable part of the whole affair. "It is not to be supposed," says he, "that quinine will prevent the occurrence of fever in every case, but in a sufficient number, to be of the utmost benefit, and the fever occurring in those cases in which it has been employed as a prophylactic, is sure to be of little moment," though we have just seen, that fifty per cent of his cases had "*severe remittent fever*."

The fact, then is, that there are great differences among constitutions, in respect to susceptibility to the influences of this miasmatic poison; some resisting it many days, as we see in the case of the thirty-four men just related, of whom only fifty per cent became infected during the seven or eight days of exposure to which they were subjected. Others require only a day or two, and in a few *rare* cases, as I have abundant reason to believe, a few hours are sufficient to produce such infection.

All these facts therefore, must be taken into account, in estimating the real effect of quinine in any given cases, lest this drug

get the credit of what really was performed by the unaided "*vis medicatrix naturæ*." I took much pains to do this in the cases from whose results, my conclusions were drawn, that quinine *will protect from miasmatic infection*.

This power conceded to it, the query very naturally arises, how long may it be relied upon as such protective. This is a much more difficult question to work out a reply to, than would generally be supposed, by those who are not acquainted by experience, with the details of this proposed management. A man is rarely found who will submit to an interminable drugging, particularly if it be urged upon him while in perfect health, as it must be, in such an experiment as this.

On this account, I was always unable to determine the limit; but I feel able to reply with confidence, that it may be depended upon for at least thirty days: generally double that time, which is long enough for any useful purpose.

The various published reports touching this point, (among them one is published by the Sanitary commission, stating that in one instance, a period of one hundred and forty days seemed to make no difference in the action of the drug, and supposed to be conclusive of its permanent power), nearly all refer to its action as a preventive of paroxysms, and not a protective from infection. This one hundred and forty day case is particularly so; so that as a matter of interest to this point, it is worthless. This protective power is of the greatest utility to the transient resident, who may desire to get off, without carrying with him the poisonous impression, which will eventually develop into disease.

If this residence is not to be more than sixty days, and there are weighty reasons for avoiding any possible subsequent trouble, I would urge the continuation of the impression of the medicine, to an unquestionable degree, the whole time. If it is to be much longer than two months, I would not think of keeping up such influence longer than thirty days, because, as we have seen, a residence of that length of time in the locality, will have so modified the constitution, that any fever symptoms he may suffer after will be of mild type, and very amenable to the preventive treatment. As to the amount of the dose requisite to produce the desired effect, it is obviously impossible to determine precisely. Whether it is absolutely necessary to give sufficient to produce the nervous impression or not, I am by no means certain.

But as there is clearly much doubt, short of this evident effect, as to whether your medicine is acting or not, I have always thought it a safe error, if error at all, to be thus far certain, and I recommend its employment in the same manner, viz: never give it in doses too small to be felt in some way.

For further and fuller understanding of this important point, I wish to state, that though ringing of the ears, with occasional impairment of hearing, is the almost universal sign of the quinine action, there will not infrequently be a sudden voracious appetite, or a tremulousness of the hands, or a queer feeling of fulness of the head. Two medical gentlemen of my acquaintance, almost invariably experienced in their own persons, as the only evidence that the quinine was acting upon the system, a sudden activity of the kidneys, and copious secretion of limpid urine. Now, in making a rule for the protective administration of quinine, we must bear in mind the cases of great susceptibility to miasmatic poison, which is so marked in some as to render only a few hours exposure, as we have seen, quite enough time to seriously infect them; and as it is impossible to tell how many of such ones any party or army may include, it is very advisable to treat them all as such cases, especially as it can do no hurt; the quinine being as harmless an article in such doses as any alcoholic stimulant in moderate amount.

The rule then for all cases is, when men are about to be exposed to miasm, give them from three to five grains—according to known effect—before exposure, and repeat the dose once in *twelve* hours, during the whole period of exposure, up to about thirty days in the *permanent* resident; extending it even to sixty days in the *transient* resident, where there are peculiar reasons for desiring to avoid subsequent miasmatic disease; not forgetting that cases often occur, wherein it will be necessary to repeat the dose once in *eight* hours to keep up the required *quinine effect*, which is our only certain guide, and is to be carefully watched and maintained in all cases.

Another rule is, no quinine is required after exposure ceases. The form in which it may be given, is not a matter of enough importance to occupy time with here.

2. *Prevention.*

Miasm and miasmatic poison, still remain impenetrable mysteries to the profession. What is miasm? What is the pathology

of miasmatic disease? About all we know of the former is, that heat, moisture and vegetable matter are the requisites for its production.

Of the latter, judging from the similarity of phenomena, it would appear to be somewhat like that produced by the presence in the system of unassimilated substances, such as mercury, lead, &c.

Whether miasm is not actually some minero-vegetable compound, passing off in the form of fumes, like those from mercury, iodine or camphor, and thus entering the system through the respiratory mucous membrane, produces its permanent poisonous effect so often witnessed, is as yet an unsolved problem. There are some points of resemblance between the conditions produced by this poisonous action and those which occasionally follow concussion. This impression of miasm once fixed upon the brain, the paroxysms of disease which indicate it, may continue to recur for long periods after, though far removed from the cause. As a brain which has suffered concussion and loss of memory, or epilepsy, or paroxysmal delirium, or mania, or change of disposition, follow occasionally for a long period of time after, so a brain which has received this poisonous impression from miasm, generally recovers by degrees, and in some cases continues to manifest the state of disease in which it has been left, by an occasional paroxysm of fever during the remainder of the life of the individual. But we do know some useful facts connected with this subject. We know for example, that its manifestations in disease are periodic, and that they are rarely experienced without having given warning of their approach, more or less in advance, by what we call premonitions. These premonitions are also generally well understood. To avoid the paroxysm guided by them, is the province of the *preventive* treatment, or the preventive use of quinine. When in the rule given for the protective treatment, it was ordered not to continue it beyond thirty days, its object was to avoid a possible insensibility on the part of the brain, to the action of this drug, and a consequent ultimate infection under most unfortunate circumstances, the sheet anchor of the treatment having become inert. But the acclimating process having been secured by this period of protection, the type of the disease whenever it may appear, will almost certainly be mild, and by suspending the medicine then, it will afford the brain ample time to recover its susceptibilities, and at the first

appearance of the premonitions, to be in the best possible condition for the preventive use of the medicine.

By this piece of strategy, though the enemy is permitted a foothold upon your territory, your forces are so recuperated and strengthened that he is completely under your control.

There is every reason for believing that the system will become more or less insensible to the action of quinine, as it is known to, to that of alcohol, opium, and other medicines of that class, when it is *continuously administered*. In miasmatic regions it is no unusual thing to see cases of this disease in which quinine is apparently inert. I have myself seen many cases of miasmatic fever whose paroxysms continued to come on regularly, notwithstanding the ears were ringing from quinine; but I do not remember to have ever seen such a case in one who had not taken much of the medicine, and more or less continuously, *immediately* before the attack. A long period of use of the quinine in my own person, has convinced me that a daily employment of it may be continued for months in succession with little effect upon the susceptibilities to its action, provided the daily impression is limited to from *eight to twelve* hours. During the period of respite thus secured, the nervous system appears to recover its tone and sensitiveness, and on the succeeding day, the dose is about as active as any of the previous ones. During the six years that I was in the very frequent use of it in my own person, I never discovered the least diminution in its activity upon me so far as the *signs* it produces were concerned, but I rarely took it many days in succession. The sanitary commission, in the report referred to, give the case of a rice plantation overseer who, though said to have protected himself for many years by the daily use of quinine, was undoubtedly one of these prevented cases. The very fact of his having been acquainted with this power of the medicine, is proof to me that he had learned it by experience, which it does not appear to me at all probable he could have done without having had fever some day, and consequently was an infected case. It is much more likely that he was in the habit of taking the quinine before going into unhealthy localities, whenever he thought of it, but his main dependence was in taking it when he felt premonitions. This kind of people are, however, liable to take frequently and excessively of the medicine, with little rule, and indefinite object. Some of the most troublesome cases of fever that ever came into my

hands, were men who had followed for more or less time the promiscuous and excessive use of quinine. But as we have just seen, a single daily dose will not generally impair the susceptibilities to its action, and if one fears to trust to premonitions, I would not urgently object to this manner of employing it though he will unquestionably consume a much greater amount of the drug than he who takes it when he feels the premonitions only, and on this account is often very objectionable. The commission quotes still another case from the same author, of a railroad contractor, who fell seriously ill of remittent fever contracted on his work. He was protected during the remainder of the season by the daily use of quinine, as was supposed. Had this account terminated here, it would have been well enough, and would have shown quite enough; but it is very much weakened by his going on to state that this gentleman had left on his work one hundred and fifty negroes, who, he *feared*, would get the fever also, as they had come from an up-country place, and to prevent it, if possible, he carried back several pounds of the quinine with him when he returned after his convalescence, and began dosing them, and consequently they had no fever throughout the year.

Now we see that these same negroes had been in this miasmatic locality since before the contractor fell sick, had remained there during his absence, ample time to become infected and to have suffered fever as he did had they been susceptible; but nothing is said of there having been any sickness among them, nor having shown any sign of infection. On the contrary, we are told that they were well the whole season, and that it was owing to the *quinine*, which they did not take any of till long after they should have had fever, were they going to suffer at all. It is pretty well known that the negro is much less susceptible to miasmatic poison than the white man. This is a general truth, with now and then an exception, and had much to do doubtless with this case.

This want of accurate information is almost a peculiarity which marks to a singular degree, nearly all of the reports upon this use of quinine, which have come to my knowledge. There seems not to have been any definite plan or theory to guide in its administration, entertained by any one who has written in its favor. The terms preventive and prophylactic, have been so promiscuously and synonymously employed, and recommendations and statements of experience so general and vague, that it is

next to impossible to determine what any one has done, and what were the real results. One of the most historic cases of this species of medical literature, is from Du Chaillu's travels in Africa. The substance of it is, that this traveler took from the day of his arrival three or four grains of quinine morning and evening, and found it a good preventive; but it would appear that it did not protect him, for a little further on he says, that during his whole stay in Africa, he took from time to time, when in perfect health, a dose of quinine as a prophylactic. So he must have had periods of being out of health. Taking all of the accounts together, it is quite impossible to say how he did take the medicines, and indeed to learn any useful thing positively by this statement; and yet it has been reproduced as a guide to those who have in charge the precious lives of our soldiers and seamen. Of all the uses of quinine, there is none into which one will fall so readily, almost unavoidably, as this preventive use. Indeed, to know the premonitions of miasmatic fever, and to understand the power of quinine to control and cure developed disease, almost as a matter of course, leads to this application of it. I have often been questioned by persons who knew nothing of quinine, except that it was used to cure fever, and that it had done so in their own cases, if it would not also "stop the fever taken when they felt it in their bones."

I was never taught this use of the medicine, but when at the end of about a month's residence in the miasm of the Isthmus, I lost my appetite, began to feel pains in my knees, and other signs which I recognized as premonitions of miasmatic fever, the first idea of treatment which suggested itself, was to take quinine, precisely as if preventing a tertian attack. I accordingly took an eight grain dose, which set my ears to ringing, and I followed it up by a five grain dose as often as its effect appeared to be passing off, for forty-eight hours. The threatening symptoms all disappeared within six hours after the first dose, and were relieved by it; the subsequent ones were taken as a precautionary measure only. This measure was the result of my knowledge of the quotidian and tertian habits of the disease, and not of almost intuition, like taking it with the premonitions. Persons without such knowledge, will need instruction as a rule, upon this point, else they may be overtaken a day or two after, by the recurrence of the paroxysm, with no time to take the medicine. Two weeks after my first signs of infection, the same premonitions reap-

peared. I determined to take smaller doses, and depend upon repeating them. I took a five grain dose, and not feeling relief, repeated it in two hours. An hour after the second dose, my ears began to ring, but in every other respect I was well. At the first quotidian period and the second also, I took five grains as a matter of precaution, not feeling any signs of disease. This experience lead me to omit these precautionary doses in my own case, and I soon began to adopt it in a large number of cases, depending entirely upon the premonitions, as indications, and to suspend it at once they disappeared. This general plan I followed throughout my residence in the tropics, having on some occasions to increase the quantity largely, and again less was sufficient. On one occasion, during the rainy and sickly months, at a period of the year when vitality in those regions is reduced to its minimum, I felt the usual premonitions and took a five grain dose, but as the time for the second dose approached, all of the symptoms were becoming more severe, and I accordingly within two hours from the first, took a ten grain dose. I found it necessary to take three such doses in the course of nine hours to get relief, which was finally perfect, but thirty-five grains were taken within eleven hours from the first appearance of the premonitions, to accomplish what ten grains had always done before, and five grains had frequently effected. These recurrences of premonitions, were sometimes as often as once a week, and on other occasions months would pass without a sign of them. In this manner, I prevented any development of fever for four years, and with such perfect results that I really began to suspect that I might have been deceiving myself, and that what had been regarded all of this time as premonitions of miasmatic disease, might after all, be something else.

Accordingly, I determined to settle the doubt, by taking no more quinine for them. The result, as it appeared to me, was that at the end of about twenty hours, the same premonitions so often suffered, matured into the cold stage, of what turned out to be, a mild, but regular paroxysm of intermittent. I had the satisfaction, therefore, if not the pleasure of suffering my first ague and fever. I was no longer curious, and never again allowed my premonitions to go on unattended too. The plan then was, to depend upon the premonitions as guides to the administration of the medicine, and to arrest them by the smallest amount compatible with safety. As a rule, this can be accomplished by a

five grain dose once in two hours till relief is felt, but if symptoms increase under this amount, double it, as we have seen I was obliged to, in my own case. Among those persons, who, as superintendents, mechanics, &c., have duties which require them to be out of doors, and much exposed during the whole day, a ten grain dose, is a much safer amount than two of five grains, at any considerable interval, and frequently much more convenient. Therefore, a person of this class who begins the day with creeping premonitions, will almost invariably get through the day all right, if he take a ten grain dose before starting in the morning, but if he take only five, and carry along another to take later, he may come back to you during the day with fever. Persons in doors, and where they can be under constant observation, can usually be treated with much smaller doses. But it is unsafe, and of course inadvisable, to allow the out-door class of persons above-mentioned, to depend too entirely upon their early premonitions. They should never be allowed to go away for a day, without a dose in their pockets, and it is generally well to give them a dose on the two days following the one on which they suffered the premonitions. They are easily instructed to look out for the premonitions, and it should be the invariable rule of the physician to so instruct them. In accordance with this plan, I have often put into the mouths of men who were working in the midst of tropical swamps, a ten grain dose, because they told me as I was passing, that they felt certain pains and signs, which I considered premonitions of fever, and I have had the satisfaction of seeing them come home at night, hungry and healthy.

But what is to be done, in those occasional cases wherein there are no premonitions, or if there are any, they are so immediately followed by the paroxysm, that no time is given for the action of the quinine. I know of no guide in such cases so valuable, as the one afforded by the well known habit of miasmatic disease, of recurring at seven day periods, or some period of which seven is a multiple.

A full dose of quinine on the seventh and eighth days, will generally carry such persons along for months without fever.

Much has been said and written of late upon the subject of the *daily* use of quinine after infection, for the purpose of avoiding paroxysms, but all that I have witnessed of this disease, and of the action of this drug, has thoroughly convinced me that there is neither safety, necessity or economy in the plan. It is easy to

show by means of data in my possession, and the evidence published, that the amount of quinine required to carry a person through one year's exposure, after his infection, by this daily dosing, would be at least *double* that needed in treating the premonitions only. This opinion is corroborated by all my former colleagues whom I have consulted.

The rule then is, after the subject becomes infected, never give him quinine without he has premonitions of an approaching paroxysm. Arrest them promptly by full doses—not generally less than five grains—repeated once in two hours, so long as indicated, taking care to make them large enough to accomplish the object. The first and second quotidian periods after, should be passed under the influence of the medicine, by all persons much exposed, and away from the immediate supervision of the physician. It can hardly be forgotten by any one, that where a very prompt action is required, it should be given in solution.

3. *Curative.*

But little can be said of quinine as a curative, which will interest the profession, but as these remarks may reach those who are commencing the duties once before me, I think it well to say a few words. There is little question I believe, that this medicine is a stimulant, but there is reason for believing that this property of it is not generally manifest. In my experience with it, I am not at all certain that I have ever witnessed any such effect, in cases which had not miasmatic complications. I have often seen patients in a typhoid condition from miasmatic fever, rapidly sinking under the effect of brandy and diffusible stimulants, changed in the most incredible manner for the better, by a full dose of this medicine. The experience of those who have advocated it in typhus, typhoid and yellow fevers, has not so far as I know, come up to their expectations. Its province then would seem to be in miasmatic disease, and it certainly behaves as much like a specific in it, as does iodide of potash in syphilitic periostitis. It seems well settled then, that quinine is a stimulant, with regard to miasmatic disease, and my experience with it has fully satisfied me that it is of service given at any period of an attack of miasmatic fever. I have seen it act in a prompt and happy manner in the cold collapsed condition of malignant, and in the burning apoplectic condition of the more violent remittent fevers, and as before stated, in the typhoid

conditions of these diseases. Its action as a stimulant is sometimes very disagreeable and even dangerous. To illustrate. An intellectual and active gentlemen had suffered an intermittent some ten days, which had almost become continued from exhausted vitality. He at once stated that he wished to be treated without quinine, as he was unable to stand its action. Whenever he took it his skin became hot, his head began to ache, his pulse grew violent, he was more or less delirious, and altogether, his symptoms became alarming. I prevailed upon him to allow me to do the thinking, and to take quinine. He was put upon ten grain doses of the medicine, in solution, sufficiently frequent to keep up the influence. I never saw more happy effects. He was at once relieved of his febrile symptoms, and made a rapid recovery. The doses which he had taken with such unhappy results, were two grains once in two hours, and apparently had stimulated the brain just sufficient to maintain the struggle, while the ten grains at once decided the contest. I have no doubt that much more injury has been done by giving this medicine in too small doses, than in too large ones. But when a person after complaining for more or less time of premonitions of fever, suddenly falls, as if seized with apoplexy, insensible and almost lifeless, and you find him with cool skin, dilated pupils, slow, quiet respiration, pulse small and frequent, unable to swallow without strangling, involuntary stools perhaps, and all these appear to increase, as the moments pass, and he is evidently sinking, it may seem almost useless to attempt any remedial measure, but I have seen just such cases, in all probability saved from destruction, by a few grains of quinine introduced into the rectum in solution.

These are said to be not infrequent cases in armies marching or drilling, in miasmatic tropical regions. I have had the fortune not to see many of these cases. The early ones died, as I believe, because I did not know what to do for them; the later ones were saved—I have little doubt—by the use of the quinine as above mentioned. Quinine, unless introduced in solution, must be to a very considerable extent lost, when used by the rectum, from well known physiological reasons. There will rarely be any discomfort produced by the introduction of a warm solution in water, of the strength of five grains to the ounce, and to render it less likely still, a little morphia may be added to it; which by the way, is often a valuable adjuvant to the quinine. As a rule, a greater amount than ten grains introduced

in this manner, will rarely be required. I have seen one such dose produce a most remarkable and prompt reaction, and restore reason and sensibility. It is absorbed with rapidity, so much so, that a dose of this size may be given once in half an hour or three-quarters. But another case presents, with a parched and burning skin, a tumultuous action of the heart, the carotids beating furiously, the pupils fixed, the respiration labored, sometimes slightly stertorous, the face livid and swollen, and sometimes subsaltus tendinum. One begins to think of his lancet before such an array of symptoms, but when he feels of the pulse, he will discover that in all of the tumult, it is weak. A little enquiry will show that the patient had complained of feeling unwell, more or less time, had suffered the various pains and aches so characteristic of miasmatic poisoning, and perhaps that he had suffered a chill of more or less severity, and that this heat had come on, with all of its attending symptoms after. Almost invariably, he will also be found to have resided in the locality for only a few weeks, and to have been exposed not only to miasmatic, but to heat and fatigue, and other causes of prostration and disease. It is indeed a case of severe first miasmatic disease of warm climates. In this condition of the vital forces, it is necessary to know the peculiar power of quinine as a stimulant, in order to be persuaded of the propriety of administering it. I have never seen anything in the use of quinine more satisfactory than the prompt manner it will act in just such cases as this, in quieting the circulation, hurrying on perspiration, and restoring the reason. In these cases, the mode of administration by the rectum is generally requisite. Where one paroxysm of fever is likely to be overtaken by the second, the quinine to meet it, and the possibility of some anticipation; should be given within twelve or eighteen hours, whether the skin be moist or dry and parched. A ten grain dose of the medicine under such circumstances, is often worth all of the sudorifics of the *materia medica* to bring on perspiration as it is in any obstinate remittent or continued miasmatic fever.

In conclusion, I would offer the following summary of deductions:

First—When men are to be sent into miasmatic localities, either from ships or from land forces, a dose of quinine sufficiently large to produce some appreciable evidence of its action, should be taken by every one before entering such locality, and should be repeated once in twelve, and in some cases once in eight hours

(which it will be the physician's duty to ascertain and prepare for) during the time spent there.

Second—That removal from a miasmatic atmosphere for any twelve hours, and especially during a night, is quite equivalent as a protective, to one dose of quinine; it may be much more economical, and when practicable, is by far the most desirable protective measure.

Third—That in all cases where this measure can be daily practiced, it will unquestionably preserve the susceptibilities of the brain to the action of the medicine, for an indefinite and probably long period, and will thus serve indirectly as a most efficient protective.

Fourth—That officers and chiefs in command, should by all means avail themselves of the advantages to be derived from such intermissions in exposure, and thereby maintain their susceptibility to the quinine more or less unimpaired. By so doing, the loss of their important services would be rendered much less liable, and the consequent embarrassment to operations would almost surely be avoided.

Fifth—That when continuous exposure is inevitable, there is no safety in attempting to protect from infection by the use of quinine, for a longer time than two months, and as a general rule, it is not advisable for longer than one month.

Sixth—That ceasing its administration at this period, by the time the infection takes place, and the premonitions appear, the susceptibilities to the medicine will have become so restored that it will be practicable generally, to prevent the paroxysms for long periods of time.

Seventh—That as quinine is a stimulant, with specific action in all conditions of depression or exhaustion from miasmatic poison and miasmatic disease, it is indicated in all cases, irrespective of the state of the skin, when the unaided powers of life are likely to be unable to restore to healthy action within the time required to avoid a renewed attack, and also when there may be danger that the vital forces will be overwhelmed by the poison in the onset of the disease, and that when so indicated, it should be promptly and efficiently employed, either by the stomach or rectum, as the case may demand.

Eighth—That by an observance of these rules, and by avoiding the causes of other diseases, most men of even ordinary constitutions, can be kept in miasmatic localities for years, in an efficient state of health.

